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Assessing the Forms and Functions of Aggression Using Self-Report: Factor Structure and Invariance of the Peer Conflict Scale in Youths

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Assessing the Forms and Functions of Aggression using Self-Report:
Factor Structure and Invariance of the Peer Conflict Scale in Youth

Abstract

This study examined the structure of a self-report measure of the forms and functions of aggression in 855 adolescents (582 boys, 266 girls) aged 12 to 19 years recruited from high school, detained, and residential settings. The Peer Conflict Scale (PCS) is a 40-item measure that was developed to improve upon existing measures and provide an efficient, reliable, and valid assessment of four dimensions of aggression (i.e., reactive overt, reactive relational, proactive overt, and proactive relational) in youth. Confirmatory factor analyses showed that a four-factor model represented a satisfactory solution for the data. The factor structure fit well for both boys and girls and across high school, detained, and residential samples. Internal consistency estimates were good for the four factors, and they showed expected associations with externalizing variables (arrest history, CU traits, and delinquency). Reactive and proactive subtypes showed unique associations consistent with previous literature. Implications for the use of the PCS to assess aggression and inform intervention decisions in diverse samples of youth are discussed.

Keywords: reactive aggression, proactive aggression, relational aggression, adolescents

Assessing the Forms and Functions of Aggression using Self-Report:

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The use of aggression among children and adolescents is associated with a host of social, academic, and psychological problems. Aggressive youth show concurrent problems with peers (e.g., rejection, isolation), anxiety and mood disorder symptoms, externalizing behaviors (e.g., conduct problems and defiance), and delinquency (see Coie & Dodge, 1998, for a review). Further, engagement in aggressive behavior early in life is a predictor of later criminal behavior, unemployment, and marital problems (Farrington, 1991). These troubling patterns have led researchers to attempt to develop methods for identifying those aggressive youth who are most at-risk for concurrent and later problems. One such method is the subtyping of youth based on the type of aggressive behavior shown. While disagreement exists over the utility of grouping youth in this way (e.g., Bushman & Anderson, 2001), most researchers agree that aggression is a multidimensional construct and that certain dimensions are more maladaptive than others.

Dimensions of Aggressive Behavior

While broadly defined as the “intent to harm” (Berkowitz, 1993), aggression can be further understood by examining the methods by which the harm is delivered (i.e., its “forms”) as well as the purpose of the aggressive act (i.e., its “functions”). Recent research has highlighted the importance of considering the forms and functions of aggressive behavior together in an effort to inform developmental theory and intervention (Little, Jones, Henrich, & Hawley, 2003; Marsee & Frick, 2007; Ostrov & Crick, 2007; Prinstein & Cillessen, 2003). In general, most researchers agree that many of the aggressive behaviors shown by children and adolescents can be classified as either overt or relational¹ (see Card, Stucky, Sawalani, & Little, 2008 for a review). Overt aggression harms others by damaging their physical well-being and includes physically and verbally aggressive behaviors such as hitting, pushing, kicking, and threatening (Coie & Dodge, 1998; Parke & Slaby, 1983). Negative outcomes associated with this type of

aggression have been documented for decades (Coie & Dodge, 1998), with worse outcomes typically seen in children who start engaging in aggression earlier in life (Moffitt, 1993). In contrast to overt aggression, relational aggression harms others by damaging social relationships, friendships, or feelings of inclusion and acceptance in the peer group (Crick et al., 1999). Relational aggression consists of behaviors such as gossiping about others, excluding target children from a group, spreading rumors, or telling others not to be friends with a target child (Björkqvist, Lagerspetz, & Kaukiainen, 1992; Crick & Grotpeter, 1995; Lagerspetz, Björkqvist, & Peltonen, 1988) and is also associated with a host of social and psychological problems (see Marsee & Frick, 2010, for a review).

Two important questions have arisen in the study of relational and overt aggression in youth. The first is related to the level of intercorrelation between the two forms and leads to the question of whether they show unique associations with adjustment problems. In a recent meta-analytic review of 148 studies, Card et al. (2008) found evidence for both the substantial intercorrelation among overt and relational forms of aggression, as well as for their uniqueness in terms of differential associations with social-psychological maladjustment. A second important question relevant to the overt/relational distinction concerns potential gender differences. Consistent with previous literature, meta-analytic results indicated that boys tend to engage in more overt aggression than girls (Card et al., 2008). However, Card et al. found only “negligible” gender differences in relational aggression in favor of girls. Despite these and other mixed results with regard to gender differences in overall rates of relational aggression (see Crick, Ostrov, & Kawabata, 2007 for a review), many studies have found that relational aggression predicts social-psychological maladjustment above and beyond overt aggression more consistently for girls than for boys (e.g., Crick, 1996; Crick & Grotpeter, 1995; Prinstein, Boergers, & Vernberg, 2001). Also, there is evidence suggesting that when girls are aggressive, many choose to use

relational (indirect) aggression to the exclusion of physical or verbal aggression (Salmivalli & Kaukianen, 2004). Taken together, findings for the relational and overt forms of aggression highlight the importance of assessing both forms in order to gain a comprehensive understanding of aggression in youth.

Within the relational and overt forms of aggression, different functions can also be assessed (Marsee & Frick, 2007; Ostrov & Crick, 2007). A large body of literature exists examining the distinction between reactive aggression, which occurs as an angry response to provocation or threat (e.g., Berkowitz, 1993), and proactive aggression, which is typically unprovoked and often used for instrumental gain or dominance over others (Dodge, 1991; Dodge & Coie, 1987). Similar to overt and relational forms of aggression, reactive and proactive functions of aggression are highly interrelated, yet also show unique developmental correlates (Card & Little, 2006; Polman, Orobio de Castro, Koops, van Boxtel, & Merk, 2007). Meta analytic findings indicate that, though the effect is small in magnitude, reactive aggression is more strongly related to multiple indices of maladjustment (e.g., internalizing symptoms, emotional dysregulation, ADHD symptoms, peer rejection/victimization) than proactive aggression (Card & Little, 2006). However, studies have shown that proactively aggressive children overestimate the possible positive consequences of their aggressive behavior (e.g., the likelihood that it will produce tangible rewards and reduce adverse treatment from others) and are less likely to believe that they will be punished because of their behavior (Dodge, Lochman, Harnish, Bates, & Pettit, 1997; Marsee & Frick, 2007). While youth who engage in high rates of proactive aggression may not show problems in emotional regulation (Dodge et al., 1997; Vitaro, Brendgen, & Tremblay, 2002), evidence suggests a link between proactive aggression and callous and unemotional (CU) traits (e.g., poverty of emotions, lack of empathy and guilt, callous

use of others for one's own gain), a constellation of characteristics that designates a more severe group of antisocial youth (see Frick & Dickens, 2006). Research also indicates that youth who show proactive aggression are at higher risk for delinquency and alcohol abuse in adolescence, as well as criminality in adulthood (Vitaro et al., 2002).

The distinction between reactive and proactive aggression has been most often examined in youth who use overt or physical aggression (see Card & Little, 2006). Recently, researchers have also begun to examine these functions in relationally aggressive youth (Crapanzano, Frick, & Terranova, 2010; Marsee & Frick, 2007; Marsee, Weems, & Taylor, 2008; Ostrov & Crick, 2007), with results suggesting that reactive and proactive relational aggression may show some of the same divergent correlates as reactive and proactive overt aggression. For example, in a sample of detained adolescent girls, Marsee and Frick (2007) found that reactive relational aggression was more strongly associated with poorly regulated emotion and anger, whereas proactive relational aggression was more strongly associated with CU traits and positive outcome expectations for aggression. Additionally, Ostrov and Crick (2007) found that proactive relational aggression predicted social maladjustment (i.e., peer rejection and student-teacher conflict) in preschoolers even after controlling for reactive relational and proactive overt aggression. Reactive relational aggression also predicted student-teacher conflict controlling for reactive overt aggression. Overall, these findings suggest that the consideration of the forms and functions together may be important for understanding aggressive behavior across a wide range of youth. However, continuing research in this area requires an ability to measure the forms and functions of aggression in a reliable and valid manner.

Assessing Aggressive Behavior

In order to measure the dimensions of aggressive behavior, researchers have utilized a variety of methods including questionnaires, observational paradigms, and competitive computer

tasks, as well as a variety of informants including self, parents, teachers, and peers (see Polman et al., 2007 for a review). Of these, self-report questionnaires are often used to assess aggression in young populations (Polman et al., 2007). While many researchers and clinicians agree that the use of multiple informants is important for the comprehensive assessment of child behavior problems (e.g., Achenbach, 2006; Frick, Barry, & Kamphaus, 2010), numerous studies support the validity of self-report measures of aggression and antisocial behavior and indicate that youth can be accurate reporters of these behaviors (e.g., Huizinga, 1991). However, differences exist in the dimensions of aggression assessed with these self-report forms, with most measures focusing on either the forms of aggression (e.g., overt and relational) or its motivational functions (e.g., reactive and proactive) but not both. Recently, researchers have begun to integrate the forms and the functions into single measures in an attempt to assess them simultaneously (e.g., Little et al., 2003; Marsee & Frick, 2007; Ostrov & Houston, 2008).

One attempt to integrate and measure the forms and functions concurrently was conducted by Little et al. (2003) in a German sample of 5th through 10th grade children. Using self-report, Little et al. sought to assess the forms of aggression independent of the functions by measuring the “pure” forms (e.g., “I am the kind of person who often fights with others”). The researchers used confirmatory factor analysis to disentangle the four aggression types (i.e., relational, overt, reactive, and proactive), and thus were able to compute correlations between important outcome variables and the orthogonal aggression constructs. Notably, each of the four domains of aggression showed unique associations with externalizing variables. For example, overt, relational, and reactive aggression were uniquely related to hostility and frustration intolerance, whereas reactive and overt but not proactive or relational aggression were related to antisocial behavior. The authors assert that these results provide a clearer picture of aggressive behavior as a whole, in that they allow for a greater distinction between the subtypes and thus a more stringent examination of each subtype’s unique correlates.

Fite and colleagues (Fite, Stauffacher, Ostrov, & Colder, 2008; Fite, Stoppelbein, Greening, & Gaertner, 2009) conducted two recent studies in an attempt to replicate and extend Little et al.'s (2003) findings. In the first study, the researchers were able to replicate the factor structure in a small sample of American children (Fite et al., 2008). Further and consistent with Little et al., this study found that the reactive and overt subtypes of aggression were positively associated with antisocial behavior, whereas the proactive and relational types were not. In a second investigation, Fite et al. (2009) attempted further validation of the Little et al. measure in a clinical inpatient sample of children. The authors examined factor structure, correlates, and the correspondence between Little et al.'s measure and Dodge and Coie's (1987) reactive and proactive aggression measure. Findings indicated that while both measures were psychometrically sound, the Dodge and Coie measure was better able to discriminate between correlates to reactive and proactive aggression than the Little et al. measure.

Results from Little et al.'s (2003) original study and the Fite et al. (2008; 2009) studies provide support for the idea that the forms of aggression (relational and overt) can serve both reactive and proactive functions for youth. Little et al.'s aggression measure shows good psychometric properties and addresses many of the limitations of past aggression measures. Specifically, this scale was the first to include items measuring four important domains of aggression simultaneously. Also, this scale specifically focused on the harm component of aggression, whereas other scales contain items that do not measure this important defining aspect of aggression (see Brown, Atkins, Osborne, & Milnamow, 1996, for example).

Along with its strengths, however, Little et al.'s (2003) measure also has certain limitations. Specifically, items on the reactive and proactive subscales are narrowly worded, with all of the proactive items measuring aggression for gain (i.e., "To get what I want, I...") and all of the reactive items measuring aggression as a result of anger (i.e., "When I am mad at others, I..."). While these reasons for aggression are well-supported by past research (e.g., Crick &

Dodge, 1996; Dodge et al., 1997; Schwartz et al., 1998; Vitaro et al., 2002), literature on reactive and proactive aggression also supports numerous other characteristics of these subtypes, including aggression for dominance (proactive), aggression for sadistic reasons (proactive), unprovoked and premeditated aggression (proactive), and impulsive, thoughtless aggression (reactive; see Frick & Marsee, 2006, for a review). These aggressive characteristics may be particularly important in the assessment of highly aggressive and/or deviant populations (e.g., adjudicated, incarcerated, or otherwise at-risk youth).

The current study was designed to expand on existing research in several ways. First, we used a self-report measure designed to provide a more comprehensive assessment of reactive and proactive aggression. This scale developed items based on several existing scales, including the measure by Little et al. (2003), the Aggressive Behavior Rating Scale (Brown et al., 1996), the Aggressive Subtypes Scale (Dodge & Coie, 1987), the Direct and Indirect Aggression Scales (Björkqvist et al., 1992), and aggression scales created by Crick and Grotpeter (1995) and Galen and Underwood (1997). Items from these measures were pooled, and items that were not clearly related to the intent to harm were deleted. Second, items were reworded to ensure that there was direct correspondence between overt and relational items, such that for each reactive overt item there was an analogous reactive relational item, and for each proactive overt item, there was an analogous proactive relational item. These items were then reviewed by a team of faculty, graduate, and undergraduate students to ensure that the wording was easy to understand and developmentally appropriate. This process led to the creation of a self-report measure called the Peer Conflict Scale (PCS; Marsee & Frick, 2007) including ten items in each of four aggressive subtype categories: proactive overt (e.g., “I am deliberately cruel to others, even if they haven’t done anything to me”), proactive relational (e.g., “I gossip about others to become popular”),

reactive overt (e.g., “I have gotten into fights, even over small insults from others”), and reactive relational (e.g., “If others make me mad, I tell their secrets”).

Second, we expanded on previous research in community (Fite et al., 2008; Little et al., 2003; Ostrov & Crick, 2007) and clinical (Fite et al., 2009) samples of youth by examining whether the four form and function aggression domains (reactive overt, reactive relational, proactive overt, proactive relational) represented distinct and internally consistent factors across youth in three different types of settings (i.e., school-based, residential intervention, and detention settings). Importantly, this study also examined whether the reliability, validity, and factor structure of the aggression measure were similar for boys and girls. Previous work highlights the importance of continuing to examine the relationship between gender and aggression in youth in order to better inform gender-specific intervention efforts (Chamberlain & Moore, 2002). Finally, we examined overall and unique associations between the four aggression domains and externalizing variables of interest (i.e., arrest history, callous and unemotional traits, and delinquency), with a particular focus on differences between the reactive and proactive subtypes.

Method

Participants

Participants were 855 adolescents (582 boys, 266 girls) between the ages of 12 and 19 ($M = 16.15$, $SD = 1.22$). Seven youth (0.8%) were missing gender information and 16 youth (1.9%) were missing age information. Three unique samples of youth were included in this study in order to test for invariance of the PCS factor structure across school, residential, and detained settings. In particular, participants were recruited from public high schools (“high school” $n = 166$), detention centers (“detained” $n = 158$), and a voluntary residential military-style

intervention program for youth who have dropped out of school (“residential” $n = 531$). The sample was primarily Caucasian (53%) and African-American (35.3%), with a small percentage of Hispanic (0.7%), Asian (0.7%), Native American (0.7%), biracial (0.4%) and “other” ethnicities (0.6%). Approximately 9% of the sample did not report ethnicity.

Participants in the high school sample were recruited from two public schools in the southeastern United States. A detailed description of this sample can be found in Marsee (2008). Participants in the detained samples were recruited from detention facilities located in or around two large metropolitan areas of the southeastern United States. The detained youth consisted of two separate samples, one with detained boys ($n = 99$) and one with detained girls ($n = 59$). These samples are described in Kimonis, Frick, Muñoz, and Aucoin (2007) and Marsee and Frick (2007), respectively. Youth in the residential sample were recruited from a non-secure voluntary community program but were considered to represent a more severe risk level than other community samples, as 100% of them had dropped out of school at a young age, and 42% of them had been arrested at least once (mean number of arrests = 1.63, $SD = 3.45$).

Measures

Demographic information. Basic demographic information was collected including arrest history, age, gender, and self-reported ethnicity.

Peer Conflict Scale. The Peer Conflict Scale (PCS; Marsee & Frick, 2007) is a 40-item self-report measure including 20 items assessing reactive aggression (both reactive overt: “When someone hurts me, I end up getting into a fight” and reactive relational: “If others make me mad, I tell their secrets”) and 20 items assessing proactive aggression (both proactive overt: “I start fights to get what I want” and proactive relational: “I gossip about others to become popular”). Items are rated on a 4-point scale (0 = “not at all true,” 1 = “somewhat true,” 2 = “very true,” and 3 = “definitely true”), and scores are calculated by summing the items to create the four

subscales (range = 0 – 30). Research supports the distinction between the reactive and proactive PCS scales as well as the relational and overt scales, in that they show unique associations with emotional and cognitive correlates (Marsee & Frick, 2007), narcissism and delinquency (Barry, Grafeman, Adler, & Pickard, 2007), and laboratory measures of aggression and psychophysiological correlates (Muñoz, Frick, Kimonis, & Aucoin, 2008) in adolescent samples. A description of the creation of the PCS is provided in the introduction and information on its reliability in this sample is reported in the results section.

Inventory of Callous-Unemotional Traits. The Inventory of Callous-Unemotional Traits (ICU; Frick, 2004) is a 24-item self-report scale designed to assess callous and unemotional traits in youth. Each item (e.g., “I feel bad or guilty when I do something wrong,” “I do not show my emotions to others”), is rated on a four-point scale (0 = “not at all true,” 1 = “somewhat true,” 2 = “very true,” and 3 = “definitely true”). Scores are calculated by reverse-scoring the positively worded items and then summing the items to obtain a total score. The ICU total score is associated with aggression, delinquency, and both psychophysiological and self-report indices of emotional reactivity in detained and incarcerated samples of youth (Kimonis et al., 2008) as well antisocial behavior, impairment, and sensation-seeking in a large community sample of adolescents (Essau, Sasagawa, & Frick, 2006). Internal consistency of the ICU in the current sample was satisfactory ($\alpha = .79$).

Self-Report of Delinquency. The Self-Report of Delinquency (SRD; Elliott, Huizinga, & Ageton, 1985) is a 46-item structured interview that assesses delinquent behavior in youth. For each of 36 delinquent acts (e.g., destroying property, stealing, carrying weapons, selling drugs, hitchhiking, physical fighting, rape, alcohol and drug use) the youth is asked (a) whether or not he or she has ever engaged in the stated problem behavior, (b) the number of times he or she has engaged in the behavior, (c) the age at which he or she first engaged in the behavior, and (d)

whether or not he or she has friends who have engaged in the behavior. The remaining 10 items assess the arrest history of members of the youth's family. Krueger et al. (1994) reported significant correlations between the SRD and informant report of delinquency (i.e., friends or family who reported on youth's antisocial behavior during the past 12 months) ($r = .48, p < .01$), police contacts ($r = .42, p < .01$), and court convictions ($r = .36, p < .01$).

For the purposes of the current study, nonviolent delinquency, violent delinquency, and total delinquency subscales were calculated. Two items assessing rape and prostitution were not collected from the majority of the sample and thus were excluded from analyses. The detained boys and girls and the residential samples completed all other items of the SRD. However, the high school sample only completed a brief version of the SRD due to time constraints during data collection. Therefore, the total delinquency score and nonviolent delinquency scores were not calculated for the high school sample. Internal consistency for the SRD subscales was as follows: total delinquency (residential and detained samples only: $\alpha = .91$); nonviolent delinquency (residential and detained samples only: $\alpha = .90$); violent delinquency (all samples: $\alpha = .69$).

Procedures

Prior to data collection, all procedures were approved by the Institutional Review Boards (IRBs) of the participating universities. For the high school data collection, parental consent forms and invitations to participate in the study were distributed to first-period teachers for all students in grades 9 through 12 at the target schools. Only students who received permission from their parents and who provided assent were allowed to participate. After parental permission was obtained, the students were assessed in groups during their free period at school. As part of a larger battery of questionnaires, students completed the PCS, ICU and SRD.

Instructions for completing the measures were read aloud. Data collection sessions lasted approximately 60 to 90 minutes. After completion of the questionnaire packets, each student received a coupon redeemable at a fast food restaurant for a free snack. Each student completed all measures in one session (see Marsee, 2008 for more information).

For the detained sample, a staff member from each detention center contacted the parents or legal guardians of all youth currently residing at the facility and informed them of a study being conducted by researchers at a local university and asked permission to forward their phone number to the researchers. Parents were informed that their child's participation in the project would in no way influence his or her treatment at the detention center or his or her legal standing in the adjudication process. Those parents who agreed to be contacted by the researchers were phoned and the study procedures were explained to them. As approved by the host university's Institutional Review Board and the director of the detention centers, parents or legal guardians who agreed to have their child participate were asked to allow the consent process to be tape-recorded and were subsequently mailed a copy of the consent form for their records. The researchers met with youth whose parents provided consent at the detention centers in order to explain the study and obtain assent. For the detained samples, the PCS, ICU, and SRD (as part of a larger battery of self-report questionnaires) were administered orally (to control for reading level) in small groups (3 to 8 participants) at the detention centers. Following completion of the questionnaires, each participant received a snack (e.g., candy, pizza).

For the residential sample, the director of the intervention program, who serves as guardian *ad litem* for the youth in the program during their enrollment, was fully informed of the purpose and procedures of the study. The director gave consent for the youth to be informed of the study, with the adolescents being allowed to choose whether or not to participate. The PCS,

ICU, and SRD (as part of a larger battery of self-report questionnaires) were administered orally in groups of approximately 12-18 participants. Data for this study and the larger project of which it was a part were collected in three to four 45-minute sessions over approximately ten days.

Results

Descriptive Statistics

T-tests were calculated to compare boys and girls on the four aggression scales. Boys scored significantly higher than girls on the proactive overt ($t(846) = 3.43, p < .01$) and reactive overt scales ($t(846) = 2.32, p < .05$), while girls score higher than boys on the reactive relational aggression scale ($t(846) = -5.47, p < .001$).

The three sample groups were compared on PCS scale scores and age (see Table 1). A series of one-way ANOVAs with sample as the between-groups variable revealed a significant effect of sample for age ($F(2, 836) = 295.37, p < .001$), the proactive overt scale ($F(2, 852) = 11.77, p < .001$), the reactive overt scale ($F(2, 852) = 36.64, p < .001$), and the reactive relational scale ($F(2, 852) = 6.54, p < .01$). Overall, the residential sample was older than the high school and detained samples. The detained and residential samples scored higher than the high school sample on the proactive overt scale. The detained sample scored the highest of the three samples on the reactive overt and reactive relational scales.

The four PCS aggression scales were significantly correlated with one another for the full sample: proactive overt and proactive relational, $r = .72$; proactive overt and reactive overt, $r = .65$; proactive overt and reactive relational, $r = .59$; proactive relational and reactive overt, $r = .45$; proactive relational and reactive relational, $r = .77$; reactive overt and reactive relational, $r = .47$ (all $p < .001$). All correlations among the four PCS scales were also significant at the $p <$

.001 level for boys and girls separately and across high school, detained, and residential sample groups.

Confirmatory Factor Analyses

Confirmatory factor analyses (CFAs) were conducted using Mplus Version 6 (Muthén & Muthén, 2010). Mplus uses robust weighted least squares (WLSMV) estimation and is appropriate for CFA modeling with categorical data (Brown, 2006). Prior to conducting the CFAs, the “very true” and “definitely true” categories of the PCS were collapsed into one category due to the fact not all categories were represented in each group. That is, for some of the PCS items the “very true” or “definitely true” response categories were not endorsed by a given group (e.g., girls did not endorse “very true” for two items). Mplus requires groups to have the same values on categorical observed variables in order to test for measurement invariance (Muthén, 2005); thus, it was necessary to collapse categories in order to compare the factor structure of the PCS across gender and sample groups.

Three models were tested based on *a priori* hypotheses of the factor structure of the PCS. The first model tested was a unidimensional model in which all items loaded on a single general aggression factor. This model was used as a baseline model to which to compare all other factor structures. Table 2 provides the fit statistics for this and other factor models that were estimated. The χ^2 fit statistic, the Root-Mean-Square-Error of Approximation (RMSEA; Browne & Cudeck, 1993), and the Comparative Fit Index (CFI; Bentler, 1990) were used to evaluate the fit of the models. For the CFI, values greater than .95 constitute good fit and values greater than .90 acceptable fit (Hu & Bentler, 1999). For the RMSEA, values less than .05 constitute good fit, values in the .05 to .08 range acceptable fit, values in the .08 to .10 range marginal fit, and values greater than .10 poor fit (Browne & Cudeck, 1993). The unidimensional model exhibited inadequate fit according to these values ($df = 151$, $\chi^2 = 1530.809$, $CFI = .785$, $RMSEA = .104$), suggesting that the PCS measures more than one dimension of aggression.

The second model tested was a two-factor model with items specified to load onto two aggression factors: overt and relational. This analysis yielded slightly better fit ($\Delta\chi^2(1) =$

257.371, $p < .001$) than the unidimensional model ($df = 152$, $\chi^2 = 1063.686$, $CFI = .858$, $RMSEA = .084$). Finally, we tested a four factor model with items specified to load onto reactive overt, reactive relational, proactive overt, and proactive relational factors (see Figure 1). This model showed improved fit ($df = 154$, $\chi^2 = 758.588$, $CFI = .906$, $RMSEA = .068$) as compared to the two-factor model ($\Delta\chi^2(3) = 267.244$, $p < .001$), and was thus retained for all invariance testing.

Tests for Invariance across Gender and Sample

The four factor model shown in Figure 1 was used to test for differences in the factor structure of the PCS across gender and sample. Several steps were taken to test for factorial invariance across gender. First, an unconstrained multigroup model (Gender-Unconstrained) was tested for both boys and girls to provide a baseline for which to compare other models (see Table 2 for fit indices). Next, a model with all factor loadings constrained (Gender-Constrained) was tested and compared to the unconstrained model. This constrained model fit significantly worse than the unconstrained model ($\Delta\chi^2(33) = 107.181$, $p < .001$), suggesting that some factor loadings were non-invariant across gender groups. Examination of the modification indices suggested that PCS item #25 (“When someone makes me mad, I throw things at them”) was non-invariant across gender. Thus, a third model was tested (Gender-Partially Constrained) in which all factor loadings were constrained except for the loading of item #25 on factors 2, 3, and 4 for boys. This model was not significantly different from the unconstrained model ($\Delta\chi^2(25) = 25.776$, $p = ns$), generally supporting the invariance² of the four-factor structure across boys and girls.

The same set of steps was conducted to test for invariance of the PCS scales across samples (high school, detained, residential). The detained samples were combined into a single group prior to invariance testing. An unconstrained multigroup model (Sample-Unconstrained) was tested for the three samples to provide a baseline (see Table 2 for fit indices). Next, a model

with all factor loadings constrained (Sample-Constrained) was tested and found to fit significantly worse than the unconstrained model ($\Delta\chi^2(42) = 89.169, p < .001$). Examination of the modification indices suggested that PCS item #25 was non-invariant across sample groups. Based on these results we specified a model (Sample- Partially Constrained) in which all factor loadings were constrained except for the loading of item #25 on factors 3 and 4 for the residential sample. This model was not significantly different from the unconstrained model ($\Delta\chi^2(41) = 55.550, p = ns$), generally supporting the invariance² of the four-factor structure across the high school, detained, and residential samples.

Internal Consistency

Coefficient alphas were calculated to examine internal consistency of the four PCS aggression scales. Scales were created by summing the items for each scale (10 items per scale). The coefficient alphas for the combined sample were good: alpha = .82 for proactive overt, .80 for proactive relational, .89 for reactive overt, and .79 for reactive relational. Internal consistency was similar across samples, with alphas ranging from .76 to .83 for proactive overt, .77 to .81 for proactive relational, .86 to .88 for reactive overt, and .77 to .81 for reactive relational.

Correlations with Externalizing Variables

Bivariate correlations were conducted to examine the associations between PCS factors and arrest history (coded 0 = no prior arrests and 1 = one or more prior arrests), CU traits, and self-reported delinquency (see Table 4). With a few exceptions, all four PCS subscales were significantly positively correlated with arrest history, CU traits, and delinquency across gender and sample groups. As shown in Table 4, arrest history was not significantly correlated with proactive overt, reactive relational or proactive relational aggression within the high school

sample. For the total sample of boys, neither relational aggression subtype was correlated with arrest history.

Partial correlations were also conducted within the full sample to examine differences in associations for reactive and proactive aggression with the variables of interest. Both reactive subtypes remained significantly correlated with arrest history after controlling for the proactive subtypes (reactive overt controlling for proactive overt: partial $r = .26, p < .01$; reactive relational controlling for proactive relational: partial $r = .07, p < .05$). However, after controlling for the reactive subtypes, the proactive subtypes were no longer associated with arrest history. For CU traits, the pattern of results was opposite. That is, both proactive subtypes remained significantly correlated with CU traits after controlling for the reactive subtypes (proactive overt controlling for reactive overt: partial $r = .25, p < .01$; proactive relational controlling for reactive relational: partial $r = .17, p < .01$). The reactive subtypes were no longer correlated with CU traits after controlling for the proactive subtypes.

In general, both proactive and reactive subtypes were correlated with the delinquency variables after controlling for their overlap. The total delinquency variable (detained and residential samples only) remained significantly correlated with both the reactive and proactive subtypes after controlling for each other (proactive overt controlling for reactive overt: partial $r = .17, p < .01$; proactive relational controlling for reactive relational: partial $r = .14, p < .01$; reactive overt controlling for proactive overt: partial $r = .31, p < .01$; reactive relational controlling for proactive relational: partial $r = .08, p < .05$). Nonviolent delinquency (detained and residential samples only) was significantly correlated with both proactive subtypes after controlling for reactive subtypes (proactive overt controlling for reactive overt: partial $r = .14, p < .01$; proactive relational controlling for reactive relational: partial $r = .13, p < .01$) and with reactive overt after

controlling for proactive overt (partial $r = .26, p < .01$). Violent delinquency remained significantly correlated with both the reactive and proactive subtypes after controlling for each other (proactive overt controlling for reactive overt: partial $r = .20, p < .01$; proactive relational controlling for reactive relational: partial $r = .16, p < .01$; reactive overt controlling for proactive overt: partial $r = .39, p < .01$; reactive relational controlling for proactive relational: partial $r = .08, p < .05$).

Discussion

Past research suggests that youth engage in different forms of aggression that may serve distinct functions (Crick & Grotpeter, 1995; Dodge & Coie, 1987). These different functions have proven to be important for etiological theories of aggression, and they have important implications for intervention (Marsee & Frick, 2010). Recently, researchers have begun to integrate the forms (relational and overt) and the functions (reactive and proactive) into single measures in an attempt to assess them simultaneously (e.g., Little et al., 2003; Marsee & Frick, 2007; Ostrov & Houston, 2008). The purpose of the current study was to expand on this literature by examining the factor structure, reliability, and validity of the Peer Conflict Scale (PCS), a self-report measure of the four form and function aggression domains (reactive overt, reactive relational, proactive overt, proactive relational).

Confirmatory factor analyses showed that a model specifying these four factors fit the data well for both boys and girls and across high school, detained, and residential samples. Importantly, the four-factor structure fit the data better than both one (general aggression) and two factor (overt and relational aggression) models. The four factors showed good internal consistency reliability across samples. Furthermore, the four factors showed expected positive correlations with important externalizing variables (arrest history, CU traits, delinquency). These results support the importance of assessing all four dimensions of aggression in order to gain a

more comprehensive understanding of the ways in which youth aggress, as well as the reasoning behind their aggressive acts.

As noted previously, a number of self-report measures of aggression have been used in past research (Björkqvist et al., 1992; Brown et al., 1996; Crick & Grotpeter 1995; Dodge & Coie, 1987; Fung, Raine, & Gao, 2009). However, few have attempted to measure both the forms and functions of aggression in a single measure (see Little et al., 2003 for a notable exception). The PCS was designed to provide a more comprehensive assessment of aggression compared to past measures by measuring a large number of potential reasons for reactive and proactive aggression. Given the high rates of aggressive behavior among more deviant samples of youth (e.g., adjudicated, detained, incarcerated), it seemed important to include items assessing aggression for dominance (proactive), aggression for sadistic reasons (proactive), unprovoked and premeditated aggression (proactive), and impulsive, thoughtless aggression (reactive). Importantly, the current results suggested that this expanded measure showed a similar factor structure and good internal consistency across samples representing varying levels of deviancy (high school students, detained adolescents, and youth in a residential intervention program). These findings suggest that the PCS may be appropriate for use as a screening instrument for the four factors of aggression in both school and juvenile justice settings and help to identify different groups of aggressive youth who require different treatment approaches (Frick & Morris, 2004; Marsee & Frick, 2010).

Given that the PCS assesses a form of aggression that may be particularly important for understanding the adjustment of girls (i.e., relational aggression) and that it separates this form of aggression into both reactive and proactive types, this measure could be especially relevant for use in research with girls. Thus, it is important that our findings indicated that the four factor structure generally fit well for both boys and girls. Consistent with previous research (Archer, 2004; Card et al., 2008), boys in our study reported higher levels of overt aggression (both reactive and proactive) than girls, whereas girls reported higher levels of relational aggression

(reactive only) than boys. Moreover, the reactive and proactive subtypes of relational aggression were associated with arrest history for girls but not for boys. These results are in line with the idea that relational aggression is especially important to consider when assessing behavior problems in adolescent girls because it may be a marker for more serious antisocial behavior (Moretti & Odgers, 2002).

The substantial correlations found between reactive and proactive aggression in this study are consistent with previous research (Card & Little, 2006; Polman et al., 2007) and reinforce the importance of studying the correlates of the two types of aggression in a way that controls for this correlation (Crapanzano et al., 2010). Although it was not directly tested in the current study, past research suggests that these correlations are largely due to the fact that there are two distinct groups of children with aggressive behavior; one group that shows moderate levels of reactive aggression only and one that shows high rates of both reactive and proactive forms of aggression. Such results have been found in clinic referred (Dodge & Coie, 1987), non-referred (Brown, et al., 1996; Crapanzano et al., 2010; Frick, Cornell, Barry, Bodin, & Dane, 2003), and adjudicated (Muñoz et al., 2008) samples. The high correlation between the two types of aggression and the fact that the combined aggressive group is typically more aggressive overall has led some researchers to question the importance of distinguishing between reactive and proactive aggression (Bushman & Anderson, 2001).

Thus, it is notable that the PCS, after controlling for the overlap between reactive and proactive functions, was able to document several unique associations with externalizing variables. For a self-report of arrest history (i.e., "Have you ever been arrested?"), both reactive subtypes remained significantly correlated with a history of arrest after controlling for the proactive subtypes; however, after controlling for the reactive subtypes, the proactive subtypes were no longer associated. In general, self-reported delinquency (total, violent, and nonviolent) remained significantly correlated with both the reactive and proactive subtypes after controlling

for each other (with the exception of the association between nonviolent delinquency and reactive relational controlling for proactive relational). The differences in associations between self-reports of previous arrests and self-reports of delinquency could be due to several reasons. First, the arrest history variable was simply an indicator of one or more past arrests. As a result, it did not capture the wide range of delinquent behaviors that aggressive and antisocial youth engage in. On the other hand, the self-report measure of delinquency used in this study assessed a variety of severe behaviors, including more covert behaviors that may be associated with proactive aggression (e.g., stealing, carrying hidden weapons), as well as behaviors that may potentially be tapping into hostile, impulsive reactive aggression (e.g., attacking someone in order to seriously hurt or kill them, gang fights). Second, it is possible that those adolescents who show reactive aggression may have more trouble regulating their behavior and thus are more likely to be brought to the attention of law enforcement for their antisocial behavior.

Consistent with previous literature (see Marsee & Frick, 2010), both proactive subtypes remained significantly correlated with CU traits after controlling for the reactive subtypes, while the reverse was not true. This finding is consistent with past research showing associations between proactive aggression (both relational and overt forms) and CU or psychopathic traits in both youth and adult samples (Crapanzano et al., 2010; Kruh, Frick, & Clements., 2005; Marsee & Frick, 2007; Ostrov & Houston, 2008) This is an important finding because CU traits have been associated with a more severe and stable pattern of antisocial behavior (see Frick & Dickens, 2006 for a review), and they tend to be associated with distinct temperament and emotional correlates, such as a lack of responsiveness to distress cues in others (see Frick & White, 2008 for a review). Thus, the unique association found between CU traits and proactive

aggression supports research suggesting that the two functions of aggression could have unique affective risk factors (Marsee & Frick, 2010).

Results from the current study need to be interpreted in light of several limitations. First, all variables were assessed via self-report, which could have inflated associations among the measures due to shared method variance. However, the use of self-report was essential to the goals of this study; that is, we sought to determine the initial reliability and validity of the PCS using youths' reports of their own behavior. Also, shared method variance could not account for some of the differential associations found for the types of aggression. Further, other studies using the PCS have found that it is correlated with increased retaliatory aggressive responding to fictitious peers during a laboratory computer task (Muñoz et al., 2008), thus providing additional evidence of its ability to predict aggression assessed by other methods. Second, while the self-report aggression measure used in this study was designed to assess both overt and relational forms of aggression, some of the items on the overt aggression scales use the word "hurt" to describe the aggressive act (e.g., "If others make me mad, I hurt them"), which could be interpreted as either an overtly or relationally aggressive response. While these items are very similar to items included on Little et al.'s (2003) aggression measure, which has shown good psychometric properties (see also Fite et al., 2008; 2009), minor revisions to the wording of some items may be warranted in future research with the PCS in order to create items that unambiguously assess overt and relational aggression. Finally, when considering the results of the confirmatory factor analyses across sample and gender groups, there was one PCS item ("When someone makes me mad, I throw things at them") that was not invariant across groups. Thus, the factor loading for this item was not constrained in the invariance analyses in order to

improve the fit of the models across groups. However, this modification was done *post hoc* and must be replicated in other samples.

In spite of these limitations, there were also several strengths to the current study. First, the sample included substantial numbers of ethnic minority adolescents and included both boys and girls. Second, the structure of the PCS was examined across diverse samples of youth, which allowed us to compare the factor structure in community youth as well as youth who may show higher levels of antisocial behavior. The identification of reactive and proactive aggression in such a sample is highly useful in that research suggests that these subtypes represent distinct pathways to problem behavior, pathways which may require unique treatment approaches (Marsee & Frick, 2010). Research on reactively aggressive youth often points to emotion regulation or anger management training as an effective method for helping them address and control aggressive responses when angry (see Larson & Lochman, 2003). In contrast, research on proactively aggressive youth suggests a different approach that focuses on empathy training and victim awareness, as well as training youth to reach their goals without the use of dominance or aggression (see Frick, 2001). Finally, the PCS assesses relational aggression in addition to other more commonly assessed subtypes. Research suggests that relational aggression may be an especially important construct for understanding antisocial behavior in girls (Marsee & Frick, 2010). Using this research base to inform treatment and intervention decisions with aggressive adolescents may result in more effective treatment outcomes. To that end, the current results suggest that the PCS may be a useful tool in the assessment of aggressive behaviors that are potential targets for intervention.

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Footnotes

¹ The label relational aggression is sometimes used interchangeably with the terms “social aggression” and “indirect aggression” (see Card et al., 2008 for a more extended discussion of the similarities and differences in the use of these terms). We chose to use the term “relational aggression” due to the conceptualization that guided the development of the measure of aggression tested in this study.

² Results supported invariance across gender and sample groups for all PCS items except #25, which was significantly different across both gender and samples. As shown in Table 3, the standardized factor loading for item #25 was significantly higher for boys than girls and was significantly lower for the residential sample as compared to the high school and detained samples. Thus, it was necessary to leave this item free to vary in order to improve model fit.

Table 1

Means, Standard Deviations, and Differences in Age and Aggression Scores for the Three Samples

Variable	High school (n = 166)	Detained (n = 158)	Residential (n = 531)	Full sample (N = 855)*
Age ¹	14.97 (1.10) ^a	15.32 (1.32) ^b	16.76 (0.73) ^c	16.15 (1.22)
Proactive Overt ²	1.69 (2.92) ^a	3.33 (3.93) ^b	3.41 (4.38) ^b	3.06 (4.10)
Proactive Relational	2.22 (3.04) ^a	3.10 (3.94) ^a	2.69 (3.60) ^a	2.67 (3.57)
Reactive Overt ³	5.77 (5.68) ^a	11.96 (7.20) ^c	10.02 (7.02) ^b	9.55 (7.09)
Reactive Relational ⁴	3.42 (3.68) ^a	4.88 (5.00) ^b	3.64 (3.93) ^a	3.83 (4.13)

Note. * N = 839 for age; The Tukey HSD procedure was used to determine group differences. Row values not

sharing a common superscript are significantly different; ¹ $F(2, 836) = 295.37, p < .001$; ² $F(2, 852) = 11.77, p < .001$; ³ $F(2, 852) = 36.64, p < .001$; ⁴ $F(2, 852) = 6.54, p < .01$

Table 2

Fit Indices Comparing Confirmatory Factor Models for the Peer Conflict Scale

Model	χ^2	df	CFI	RMSEA
Unidimensional	1530.809	151	.785	.104
2-Factor	1063.686	152	.858	.084
4-Factor*	758.588	154	.906	.068
Gender -Unconstrained	545.671	178	.931	.070
Gender -Constrained	551.306	179	.930	.070
Gender -Partially Constrained	520.461	179	.936	.067
Sample -Unconstrained	432.347	163	.936	.076
Sample -Constrained	407.370	157	.941	.075
Sample -Partially Constrained	392.644	156	.944	.073

Note. df = degrees of freedom; CFI = Comparative fit index; RMSEA = root mean square error of

approximation; * denotes best-fitting model used for all multigroup gender and sample comparisons

(shaded rows)

Table 3

Factor Loadings for the Four-Factor Model of the Peer Conflict Scale

Scale	Overall (N = 855)	Boys (n = 583)	Girls (n = 265)	HS (n = 166)	Detained (n = 158)	Residential (n =531)
Reactive Overt						
3. When I am teased, I will hurt someone or break something	.65	.61	.76	.75	.67	.64
8. When someone hurts me, I end up getting into a fight	.75	.72	.84	.76	.63	.76
11. I threaten others when they do something wrong to me	.79	.79	.84	.71	.83	.80
14. When someone threatens me, I end up getting into a fight	.78	.75	.84	.69	.68	.77
16. Sometimes I hurt others when I'm angry at them	.82	.82	.86	.81	.85	.81
20. If others make me mad, I hurt them	.86	.87	.88	.94	.81	.85
*25. When someone makes me mad, I throw things at them	.76	.77	.66	.61	.76	.52
30. Most of the times that I have gotten into arguments or physical fights, I acted without thinking	.53	.50	.62	.59	.58	.49
36. When I get angry, I will hurt someone	.83	.83	.85	.89	.78	.83
37. I have gotten into fights, even over small insults from others	.75	.75	.78	.66	.73	.79
Proactive Overt						
1. I have hurt others to win a game or contest	.48	.46	.57	.49	.42	.49
5. I start fights to get what I want	.77	.75	.78	.86	.76	.75
12. When I hurt others, I feel like it makes me powerful and respected	.77	.76	.79	.76	.78	.76
18. I threaten others to get what I want	.85	.86	.80	.80	.85	.86
21. I am deliberately cruel to others, even if they haven't done anything to me	.76	.77	.75	.83	.60	.80
24. I carefully plan out how to hurt others	.64	.63	.68	.60	.58	.66
27. I hurt others for things they did to me a while back	.74	.73	.75	.66	.69	.75
28. I enjoy hurting others	.75	.76	.74	.78	.69	.78
33. I like to hurt kids smaller than me	.69	.73	.68	.58	.59	.73
35. I threaten others, even if they haven't done anything to me	.82	.83	.81	.77	.80	.83
Reactive Relational						
4. Sometimes I gossip about others when I'm angry at them	.56	.54	.70	.55	.64	.53

7. I spread rumors and lies about others when they do something wrong to me	.75	.70	.82	.73	.80	.73
10. When someone upsets me, I tell my friends to stop liking that person	.70	.70	.73	.66	.70	.71
15. I make new friends to get back at someone who has made me angry	.68	.68	.65	.68	.56	.72
17. When others make me mad, I write mean notes about them and pass them around	.70	.73	.69	.59	.77	.73
22. When I am angry at others, I try to make them look bad	.82	.80	.83	.90	.82	.79
31. If others make me mad, I tell their secrets	.66	.66	.67	.55	.64	.70
34. When others make me angry, I try to steal their friends from them	.88	.86	.90	.91	.89	.88
38. Most of the times that I have started rumors about someone, I acted without thinking	.52	.48	.61	.44	.67	.48
40. When someone makes me angry, I try to exclude them from my group	.69	.66	.73	.75	.74	.67
Proactive Relational						
2. I enjoy making fun of others	.59	.56	.69	.55	.60	.59
6. I deliberately exclude others from my group, even if they haven't done anything to me	.71	.75	.62	.65	.65	.75
9. I try to make others look bad to get what I want	.84	.84	.87	.90	.82	.83
13. I tell others' secrets for things they did to me a while back	.67	.65	.71	.71	.58	.70
19. I gossip about others to become popular	.83	.83	.84	.79	.86	.85
23. To get what I want, I try to steal others' friends from them	.81	.80	.83	.88	.75	.83
26. When I gossip about others, I feel like it makes me popular	.74	.78	.69	.45	.85	.81
29. I spread rumors and lies about others to get what I want	.77	.77	.79	.85	.77	.81
32. I ignore or stop talking to others in order to get them to do what I want	.69	.72	.67	.56	.72	.74
39. I say mean things about others, even if they haven't done anything to me	.74	.80	.65	.63	.72	.81

Note. HS = high school. Seven youth did not report gender. Factor loadings are standardized regression weights. All loadings in are significant at $p < .001$.

.001.*denotes factor loadings that were non-invariant across gender and sample ($n = 1$).

Table 4

Correlations between PCS Factors and Externalizing Variables across Gender and Sample

Scale	Overall (N = 855)	Boys (n = 583)	Girls (n = 265)	HS (n = 166)	Detained (n = 158)	Residential (n = 531)
Reactive Overt						
Arrest History	.32**	.24**	.48**	.26**	^a	.26**
CU Traits	.25**	.21**	.31**	.46**	.22**	.19**
Total Delinquency ¹	--	.46**	.55**	--	.50**	.47**
Nonviolent Delinquency ¹	--	.40**	.48**	--	.44**	.42**
Violent Delinquency	.58**	.54**	.67**	.51**	.53**	.55**
Proactive Overt						
Arrest History	.19**	.14**	.30**	.05	^a	.20**
CU Traits	.35**	.33**	.37**	.38**	.35**	.33**
Total Delinquency ¹	--	.41**	.44**	--	.42**	.42**
Nonviolent Delinquency ¹	--	.36**	.38**	--	.34**	.37**
Violent Delinquency	.50**	.48**	.53**	.42**	.54**	.47**
Reactive Relational						
Arrest History	.13**	.07	.29**	.11	^a	.10*
CU Traits	.20**	.20**	.27**	.27**	.22**	.19**
Total Delinquency ¹	--	.25**	.38**	--	.39**	.24**
Nonviolent Delinquency ¹	--	.23**	.33**	--	.31**	.23**
Violent Delinquency	.30**	.27**	.44**	.25**	.50**	.24**
Proactive Relational						
Arrest History	.12**	.07	.22**	.15	^a	.10*
CU Traits	.26**	.26**	.28**	.26**	.33**	.24**
Total Delinquency ¹	--	.29**	.36**	--	.42**	.27**
Nonviolent Delinquency ¹	--	.26**	.32**	--	.37**	.24**
Violent Delinquency	.33**	.32**	.39**	.36**	.43**	.29**

Note. HS = high school sample. ¹ Total and Nonviolent Delinquency scores calculated for detained and residential

samples only (n = 519 boys and 167 girls). ^a Correlations not calculated because arrest history variable is constant

(all “yes”) for detained samples.

* $p < .05$, ** $p < .01$

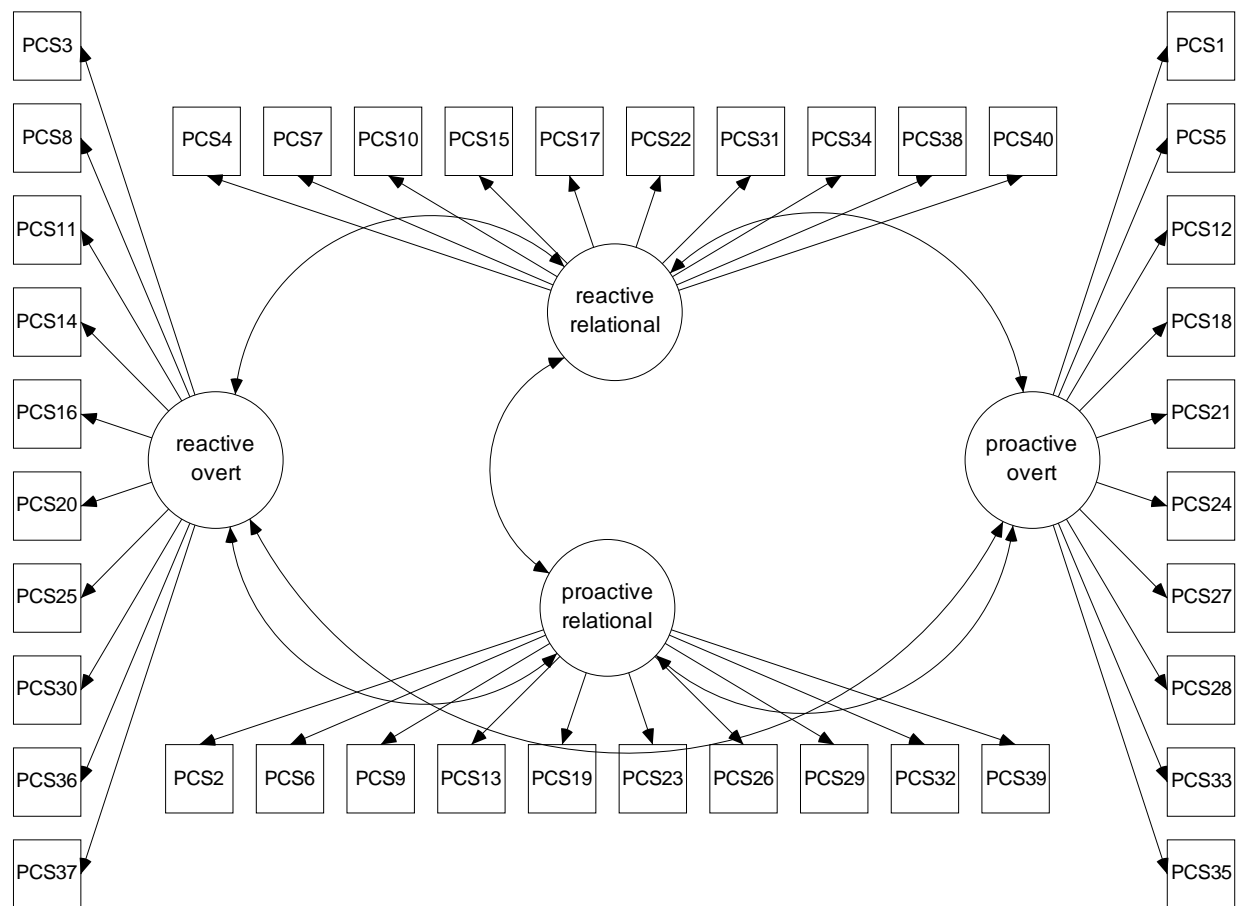


Figure 1. *Four-factor model of the Peer Conflict Scale.*